August 15, 2013

Mr. Chris Nagel
Missouri Department of Natural Resources
Solid Waste Management Program
1738 East Elm Street
Jefferson City, Missouri 65101

RE: Alternative Heat Extraction Pilot Study
Bridgeton Landfill, Bridgeton, Missouri
Permit No. 0118912

Dear Mr. Nagel:

A letter dated July 22, 2014 was submitted to your office delineating Bridgeton Landfill's planned expansion of the heat extraction pilot study at the facility. As stated in the aforementioned letter the planned expansion of the pilot study is pursuant to the successful operation of the heat exchange pipe currently operated in Gas Interceptor Well (GIW) -4.

The drawing and details attached are intended to supplement the information submitted in the July 22, 2014 letter. This submittal provides additional technical detail regarding the heat exchange pipe to be installed in 6 additional GIWs and the proposed Temperature Monitoring Probes (TMPs) to evaluate the heat removal effect. The original submittal proposed 8 TMP locations. This has been increased to 11 new TMPs for this phase of the pilot study. These locations are shown on the attached Revised Drawing No. 3.

A section view of the proposed TMPs is provided as Figure 1. As shown, the specific components are consistent with the approved TMPs 16, 17, and 18 design, currently being installed in the North Quarry. The physical components and installation procedures for the 11 new TMPs will be consistent with the 3 North Quarry TMPs, except using a modified grout mix and grout installation procedure. The proposed grout backfill mix will consist of the following:

- Portland Type II Cement- 20 lbs/Cubic Yard
- Granulated Blast Furnace Slag Cement- 70 lbs/Cubic Yard
- Bentonite- 5 lbs/Cubic Yard
- Fly Ash 1,400 lbs/Cubic Yard

The grout installation procedure will utilize a modified drill head to facilitate the grout backfill mixture to be introduced concurrently with the removal of the outer drill casing. This grout mixture and backfill procedure has been engineered to minimize the effects of the potential back pressure within the bore hole during removal of the outer drill casing.

Installation of the 11 new TMPs is scheduled to start August 28, 2014. This schedule has been delayed from the original letter start date of August 12, 2014, due to the installation delays of TMPs 16, 17, and 18, and minor drilling equipment modifications that are required.

Figure 2 presents the alternative heat extraction components to be installed in the 7 select GIWs. This consists of cool water influent piping and heated water effluent piping. The modified GIW wellhead includes a side flange to facilitate concurrent landfill gas extraction, if desired. Materials for the alternative heat extraction have been ordered and installation will begin as design components are received.

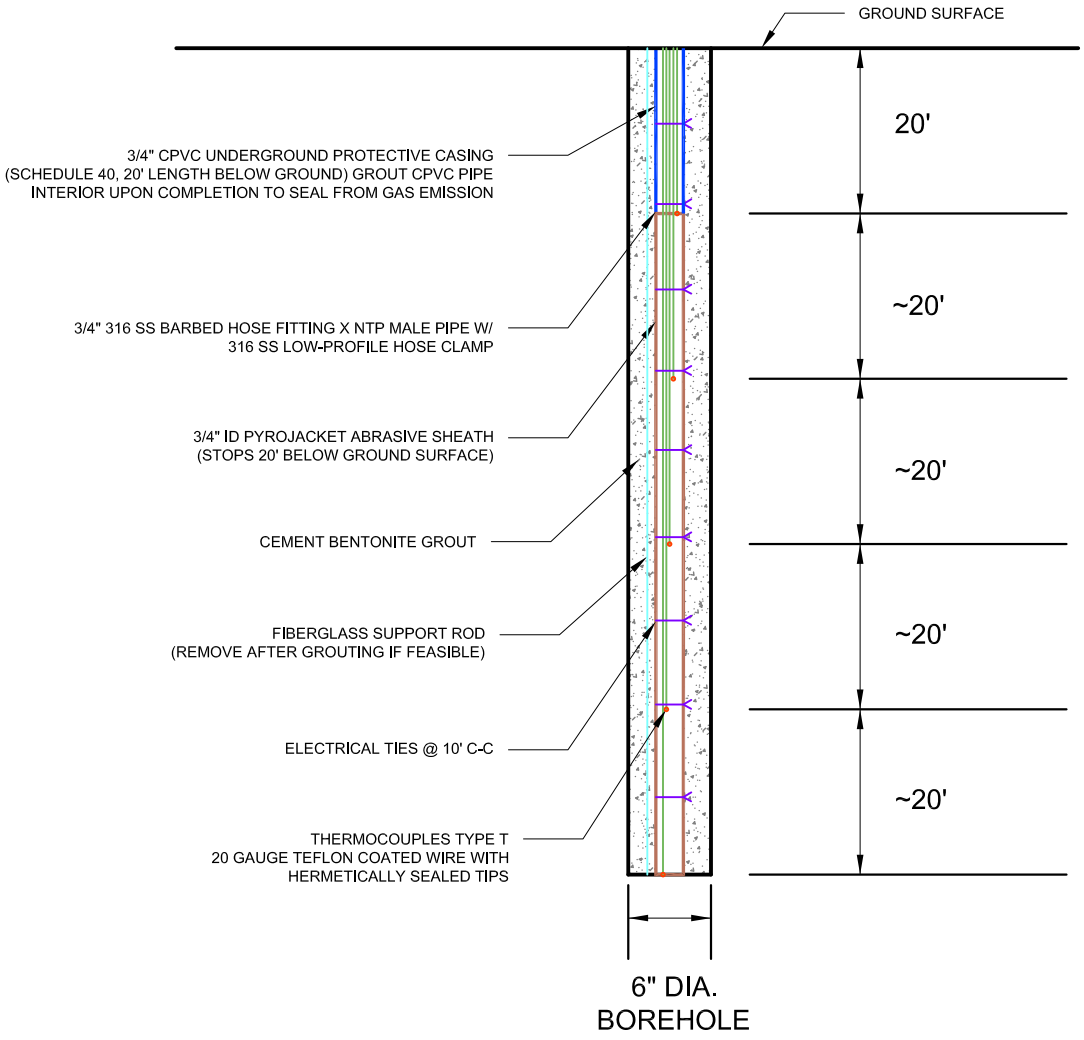
If you need additional information, please contact me at (314) 744-8139.

Sincerely,

James A Getting
Environmental Manager
Bridgeton Landfill, LLC.

Attachments

Figure 1
Figure 2
Revised Drawing No. 3



TMP SUBSURFACE DETAIL

TMP ID	(APPR. FT. BGS)	THERMOCOUPLE WIRE IDENTIFIER AND LENGTHS FROM GROUND SURFACE						
		1	2	3	4	5	6	7
TMP-19	140	20	40	60	80	100	120	140
TMP-14R	140	20	40	60	80	100	120	140
TMP-20	140	20	40	60	80	100	120	140
GIW5-9s	100	20	40	60	80	100		
GIW5-5s	100	20	40	60	80	100		
GIW5-5n	100	20	40	60	80	100		
GIW5-9n	100	20	40	60	80	100		
GIW10-9s	100	20	40	60	80	100		
GIW10-5s	100	20	40	60	80	100		
GIW10-5n	100	20	40	60	80	100		
GIW10-9n	100	20	40	60	80	100		

BRIDGETON LANDFILL, LLC
13570 ST. CHARLES ROCK ROAD
BRIDGETON, MISSOURI 63044

ALTERNATIVE HEAT EXTRACTION

FIGURE 1

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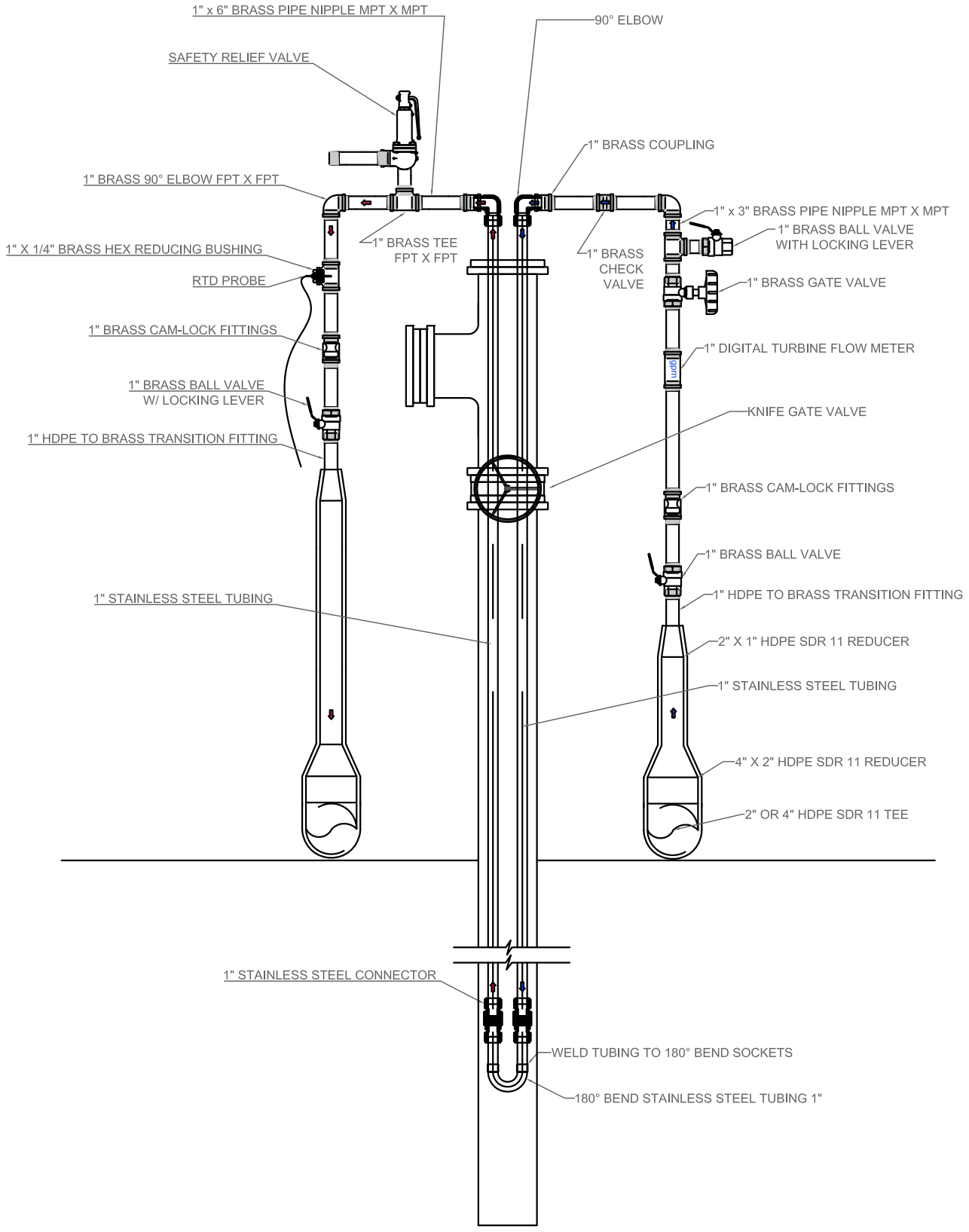
Engineering for a Better World
FEEZOR ENGINEERING, INC.



1/003 GIW WELL W/ ALTERNATIVE HEAT EXTRACTION

NTS

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	ALTERNATIVE HEAT EXTRACTION		
FIGURE 2			
PROJECT NUMBER: BT-027	JULY 2014	DESIGNED BY: AMR	APPROVED BY: ALK

Engineering for a Better World
FEEZOR ENGINEERING, INC.

2014 GIW TMP INSTALLATION			
ID	Northing	Easting	Depth (ft)
TMP-19	1067729.43	516324.34	140
TMP-14R	1067776.50	516372.41	140
TMP-20	1067712.59	516439.87	140
GIW5 - 9s	1067661.16	516397.18	100
GIW5 - 5s	1067665.2	516396.79	100
GIW5 - 5n	1067675.28	516395.69	100
GIW5 - 9n	1067679.41	516395.37	100
GIW10 - 9s	1067709.77	516384.13	100
GIW10 - 5s	1067713.85	516384.00	100
GIW10 - 5n	1067723.9	516384.95	100
GIW10 - 9n	1067727.77	516385.53	100

LEGEND

- EXISTING GRADE (2' CONTOUR)
- 500 EXISTING GRADE (10' CONTOUR)
- EXISTING GAS EXTRACTION WELL
- EXISTING TEMPERATURE MONITOR PROBE
- PROPOSED TEMPERATURE MONITOR PROBE
- EXISTING GIW (TO BE RETROFIT ALTERNATIVE HEAT EXTRACTION POINT)
- EXISTING ALTERNATIVE HEAT EXTRACTION POINT
- 4" HEAT EXTRACTION INFLUENT PIPING
- 2" HEAT EXTRACTION INFLUENT PIPING
- 4" HEAT EXTRACTION EFFLUENT PIPING
- 2" HEAT EXTRACTION EFFLUENT PIPING
- TEMPERATURE MONITORING LOCATION
- AIR BLEED VALVE
- BACK PRESSURE VALVE
- (P) EXISTING ELECTRIC PANEL
- PROPOSED ELECTRICAL SERVICE
- W PROPOSED 1" WATER LINE

NOTES:

1.) AERIAL TOPOGRAPHY WAS PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED MARCH 20, 2014.

REVISED

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL ALTERNATIVE HEAT EXTRACTION CONSTRUCTION DRAWINGS	Engineering for a Better World FEEZOR ENGINEERING, INC.	JULY 2014 DESIGNED BY: BJV APPROVED BY: ALK	DRAWING NO.: 003
PILOT STUDY - PLAN VIEW			REVISION / DATE	

PROJECT NUMBER: BT-027 FILE PATH: C:\Users\Andrew\Dropbox\BT-027\BV WORKING\GIW Enhancements (Option 4)\Construction Drawings\Alternative Heat Extraction\Permit Drawings\BT-016-CD-003-004 (COOLING LOOP INSTALLATION - PLAN